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By: **David R. Williams, Betty S. Coffey,** and Carlton C. Young

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Human capital and agency effects on CEO compensation of IPO biopharmaceutical firms and the market's response

David R. Williams[1] · Betty S. Coffey[2] · Carlton C. Young[3]

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Abstract This paper examines the determinants of base pay and total incentive compensation packages of CEOs of biopharmaceutical firms that have recently gone public, and whether human capital and agency factors affect the market's response to the initial public offering. We find that in terms of net proceeds, the IPO market appears to reward the firms that have founder-CEOs and CEOs with higher incentive compensation. CEOs with prior venture capital experience are associated with receiving higher incentive compensation, while CEOs with a greater ownership interest in the firm receive lower incentive compensation but higher salaries. CEOs of firms with a greater percentage of insiders are associated with lower salaries. The results should add to our understanding related to human capital and agency theories, as well as help firms and investors better understand and structure CEO compensation.

Keywords CEO compensation · Initial public offering · Agency issues · Human capital effects

✉ David R. Williams
willimsdr@appstate.edu

Betty S. Coffey
coffeybs@appstate.edu

Carlton C. Young
CYoung@meridian.msstate.edu

[1] Health Care Management Program, Department of Nutrition and Health Care Management, Beaver College of Health Sciences, ASU, Box 32168, Boone, NC 28608, USA

[2] Department of Management, Walker College of Business, Appalachian State University, Boone, NC 28608, USA

[3] Division of Business, Mississippi State University, Meridian, MS 39301, USA

1 Introduction

Firms face the daunting task of attracting and retaining both talent and investors. This, perhaps, is more difficult in cases where new firms are seeking to raise capital for the first time in an initial public offering (IPO). Firms must compensate executives at a level to attract and retain top talent all the while being aware that investors, regulators, researchers, and the trade press are scrutinizing executive compensation seeking greater accountability (Elsaid et al. 2011; Lewellyn and Muller-Kahle 2016). This is not a recent phenomenon as Berle and Means (1932) noted that corporate executive compensation has the potential to be disproportionate to firm performance and shareholder wealth creation. Compensation structures for large established firms have been examined for some time (Terviö 2008; Yang et al. 2011). Yet, we know little about the factors that affect executive compensation of newer firms seeking to go public (Carr 1997; He and Wan 2013) and the market's response (Certo et al. 2003; Lester et al. 2006; Nikbakht et al. 2007).

Drawing upon human capital and agency theories, the present study examines (1) the factors related to who the chief executive officer (CEO) is, (2) how compensation is structured (e.g. base salary and incentives), and (3) the effects that these factors have on the firm's ability to raise capital in an IPO—a time of transition for the firm. Our goal is to understand how the first two factors (and their relationships) influence the amount raised in an IPO. An IPO represents a significant event for many firms (Kor et al. 2008). For some firms, their short to mid-term survival is based upon raising a sufficient amount of capital during an IPO (Williams et al. 2010). Determining the value of an IPO is difficult as researchers (e.g. Lee et al. 2011; Sanders and Boivie 2004) note that traditional financial valuation methods (e.g. return on investment, sales) alone are not good predictors of determining the market's response in uncertain markets.

To assist with their valuation, investors also examine other factors such as those related to the CEO (Nikbakht et al. 2007; Simmons 2015). We posit that who the CEO is and how the CEO is compensated are important factors to raising capital in an IPO. We pay particular attention to CEO founders who play a distinct role in the IPO, human capital, and agency theory literatures (e.g. He 2008; Stucki 2016; Williams 2013). Related to compensation, researchers (e.g. Allcock 2012; Allcock and Filatotchev 2010) have discussed "hard" (unconditional) and "soft" (conditional) types of incentive compensation, with most studies focusing on soft types of compensation. We expand this literature to examine both "hard" (e.g. salary) and "soft" (e.g. incentives) compensation mechanisms and the IPO market's response, which has not been examined previously. We suggest that investors consider concurrently factors related to who the CEO is, the types of compensation, and the amount they are willing to invest. We note that human capital and agency theorists may differ in their perspectives of hard and soft compensation mechanisms.

Understanding how this compensation affects a firm's ability to raise capital is important (Certo et al. 2003). We examine IPOs as CEO compensation of new small firms is different than that of large firms. CEOs of newer firms have more control and ability to affect performance than those of established firms (Conyon and He 2004)

whereas in large firms CEO compensation is based on tradition or historical social norms (Beatty and Zajac 1994). There is also a lack of research associated with compensation of executives in newer, small to medium size firms (Conroy et al. 2015), with fundraising being a critical role of CEOs of entrepreneurially driven firms (Bengtsson and Hand 2011). We study biopharmaceutical firms as this is an industry replete with uncertainty due to few firms having marketable products at this stage, and thus, difficult to value using traditional financial measures (Ahn et al. 2015). The IPO also represents a type of institutional transition (Chen and Wilhelm 2008), with there being few studies on CEO compensation during institutional transitions (Peng et al. 2015). We study the amount raised during the IPO (i.e., net proceeds—total amount raised minus transaction costs) as there is little research related to factors affecting this (Daily et al. 2005). The study also contributes to the existing literature by testing these factors simultaneously, which we suggest is how many investors may value a firm and has not been previously reported.

2 Theory and hypotheses

Top managers are an important resource of a business. Daily and Johnson (1997: 98) note, "CEOs, in isolation, have the potential to affect firm outcomes." Finkelstein and Boyd (1998: 181) add the CEO "is pivotal to the success or failure of a firm." CEOs are the most visible executives (Peni 2014) and the drivers of strategy (Voußem et al. 2015). This holds true for biopharmaceutical firms as well (Xu 2009). This leads to the CEO typically being the highest paid employee (Henderson and Fredrickson 2001), and also among the highest paid individuals in American society (Elhagrasey et al. 1998).

Researchers (e.g. Allcock and Filatotchev 2010; Finkelstein and Hambrick 1988) have identified two important areas to examine in determining executive compensation: human capital factors (e.g. Becker 1964; Hambrick and Mason 1984) and mechanisms related to agency problems (e.g. Fama 1980; Jensen and Meckling 1976). Much of the agency theory literature relates to reducing agency problems or issues by way of aligning management interests with those of shareholders and other stakeholders (Aguilera and Jackson 2003). A vital function of CEO compensation is to reduce agency problems (Sigler and Sigler 2015). Human capital factors include characteristics the executive brings to the organization, with greater human capital usually leading to greater compensation and firm performance.

Coleman (2007: 304) notes, "prior research fairly consistently indicates that human capital plays a role in the profitability and growth of entrepreneurial ventures." Le et al. (2013) note that the success of reaching IPO milestones is mainly attributable to retaining talent at the top. Of note, founders play a prominent role in IPOs and both the human capital and agency theory literatures. Integrating these, at times, conflicting issues poses a challenge for the firm, with the relationships between CEO compensation and performance (de Angelis and Grinstein 2015), especially the market's response (Nikbakht et al. 2007) remaining incomplete. The present paper seeks to add to our knowledge related to these areas, with Fig. 1 depicting our conceptual model.

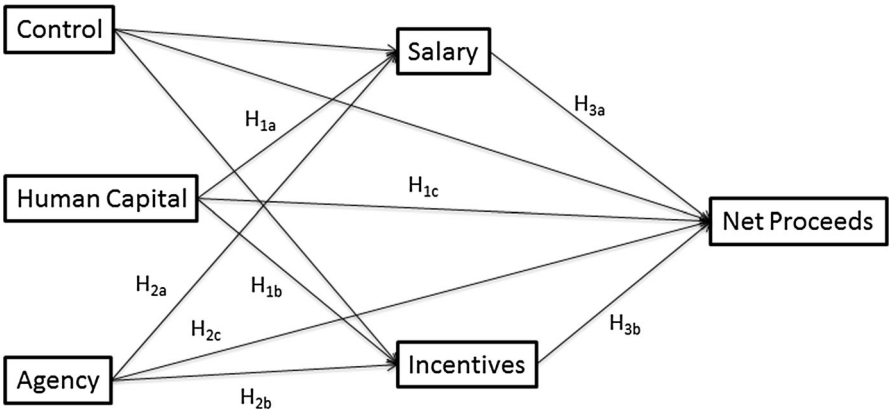

Fig. 1 Conceptual model

2.1 Human capital related to compensation and proceeds

The acquisition and retention of human capital are vital for firm success (Sturman et al. 2008). Human capital theory typically posits that a firm's outcome can be partially predicted by managerial characteristics (Matusik et al. 2008; Schulz et al. 2013). Firms with positive human capital likely achieve higher work performance that would be expected to lead to positive outcomes (Wincent et al. 2010). The human capital literature can be divided into examining quantitative and qualitative aspects (Schultz 1961). Quantitative aspects primarily relate to the number of people or hours worked with an organization. Qualitative aspects relate to the "skill, knowledge, and similar attributes that affect particular human capabilities to do productive work" (Schultz 1961: 8) such as the manager's level of education or experience. Converting them into quantitative aspects within the human capital literature often operationalizes these qualitative aspects of individuals. Human capital theory generally suggests that more or better quality human capital leads to greater performance for the individual, firm, and economy as a whole. As such, this paper focuses on the qualitative aspects of human capital.

The literature on qualitative aspects (e.g. Becker 1964; Hambrick and Mason 1984) suggests that individuals have different types of human capital ranging from general to specific (Stucki 2016; Zarutskie 2010). General human capital refers to an individual's life experiences such as education that may improve overall decision-making ability (Cooper et al. 1994). Industry-specific human capital relates to the individual's broad category of knowledge and capabilities that is somewhat specific and transferable to other industries (Sturman et al. 2008). Firm-specific human capital represents the individual's unique processes, procedures, and insights that at the extreme have no value outside of the originating firm (Sturman et al. 2008). Human capital theory suggests a positive correlation between the growth of compensation and organizational tenure (Slaughter et al. 2007). In general, more of each category of human capital leads to greater performance and increases the CEO's value. We examine variables from all three qualitative human capital

categories (i.e., elements associated with the CEO's age, education, and experience).

In small entrepreneurial firms, the founder as CEO carries unique influence during the creation and early stages, having accumulated specific knowledge relevant to the organization (He 2008). For example, He (2008) showed that founder managed firms are associated with higher financial performance than professional CEOs. Davidsson and Honig (2003) found that the CEO's prior professional experience is important in that the CEO has likely accumulated experiences that are relevant to the performance of the current organization. Formal education, an element of human capital, allows an individual to accumulate explicit knowledge that demonstrates commitment, skills, discipline and motivation (Cooper et al. 1994). The explicit knowledge gained from formal education could be expected to transfer between individuals and firms (Davidsson and Honig 2003). Researchers (e.g. Bigley and Wiersema 2002) have examined the characteristics of executive power including elite education as a power indicator, referring to D'Aveni (1990) who suggests that a top manager's prior attendance at an elite institution often transfers to an individual in the form of status.

Accumulated industry-specific capital (e.g. Buchholtz et al. 2003) has been found to be significant in knowledge-intensive industries (e.g. Barker and Mueller 2001). As such, the CEO's current and prior experiences are expected to be important to the success of the organization through firm—specific knowledge and accumulated prior experiences. Bengtsson and Hand (2011) studying private firms with venture capital backing found CEO cash pay was higher in firms that raised more equity from venture capitalists. Given this we would expect both the firm and investors to be attracted to CEOs with higher levels of human capital. Knowing this, a CEO with more human capital would be more able to command both a higher "hard" (salary) and "soft" (incentive) compensation structure from the firm as an inducement to acquire these valued capabilities and experiences (Becker 1964; Schulz et al. 2013). A higher salary guarantees the CEO payment, while higher incentives (e.g. bonus, stock options) act to increase the "upside" for the CEO. Thus, the hypotheses:

Hypothesis 1a Biopharmaceutical IPO CEOs with greater human capital will be associated with greater base salary.

Hypothesis 1b Biopharmaceutical IPO CEOs with greater human capital will be associated with greater total incentive compensation.

Recent studies also have suggested that the CEO's human capital has a positive impact not only on the individual's compensation, but for the firm as well (Gambardella et al. 2015; Vomberg et al. 2015). Individuals with higher human capital are associated with higher performing firms (e.g. Hitt et al. 2001). For example Nielsen (2015) found the firms associated with first time entrepreneurs with greater human capital performed better than those firms associated with individuals with less human capital. Others (e.g. Bantel and Jackson 1989) found that highly educated top managers were positively related to strategic change and innovation. Cooper and Bruno (1997) described the founder's knowledge and expertise as critical assets for new high-tech firms since positive capabilities and

resources need to be created within the new firm. Previous studies also linked the CEO's education to a firm's strategy and performance (e.g. Hitt and Tyler 1991). Crook et al. (2011) in a meta-analysis of human capital and performance research found that human capital relates strongly to performance. CEOs with greater human capital, thus, may signal (Daily et al. 2005; Zimmerman 2008) legitimacy and value to current and future shareholders. Thus, the hypothesis:

Hypothesis 1c Biopharmaceutical IPO CEOs with greater human capital will be associated with greater net proceeds.

2.2 Agency theory related to compensation and proceeds

Engel et al. (2002) noted that a small number of inside owners (including the CEO) dominate most firms prior to an IPO. The IPO represents a dilution of ownership interest and control for pre-IPO owners (Gao and Jain 2012). Agency theory (e.g. Fama and Jensen 1983; Jensen and Meckling 1976; Jensen and Murphy 1990) has been the primary lens addressing the separation of ownership and control (Daily et al. 2003) and IPOs (Ritter and Welch 2002). Agency theory describes the relationship where one party (the owner) delegates responsibility to another party (management), with each party potentially having separate interests. Researchers examine how to reconcile the interests of incumbent managers with the interests of owners or future owners (Allcock and Filatotchev 2010; He and Wan 2013). Oftentimes, proposals for this reconciliation involves the institution of mechanisms such as reducing CEO duality and the number or proportion of insiders on the board, and increasing CEO ownership of and commitment (via retention of founders) to the firm. A central premise of agency theory is that boards engage in arms-length negotiations with CEOs related to compensation to better align managerial interests with shareholder (and others') interests (Lewellyn and Muller-Kahle 2016; van Essen et al. 2015). This may be especially problematic for IPOs where inside owners dominate.

Alignment of interests between managers and future shareholders is critical, even for IPOs. Agency theory suggests that managers may act in ways that satisfy their own self-interest. Large established firms may hire the CEO into an existing firm, usually with no or little ownership interest. Thus, granting stock options to senior executives and others to align interests with shareholders (Pukthuanthong et al. 2007) is frequently practiced. Another agency issue in large firms is that CEOs are sometimes perceived as being risk averse (Hayton 2005; Le et al. 2013) and more interested in self-preservation than in pursuing growth opportunities that shareholders may desire.

Newer small firms going public have related, but perhaps opposite end of the spectrum, agency issues. Newer firms oftentimes have CEOs who founded the firm with significant ownership interest. Such CEOs may not be seen as risk averse since founding a firm typically indicates entrepreneurial risk taking (Chung and Pruitt 1996). The agency issue for new firms is the dilution of ownership interest at the time of an IPO. The IPO offers the pre-IPO owners, including the CEO, the opportunity to divest securities of the firm and, perhaps, exit the firm entirely (Williams 2013). Agency (e.g. He and Wan 2013) and human capital (e.g. Cooper et al. 1994; Fischer and Pollack 2004) research typically suggest that it is positive

for founders to remain with the firm. Human capital theorists view the founder's knowledge of the firm and environment as important to the firm going forward, as well as indicative of previous success. Agency theorists view founders as having greater ownership interests in the firm and, thus, greater aligned incentives with shareholders (Allcock and Filatotchev 2010).

The opposite view by agency theorists is usually true regarding duality and insiders. Duality represents one person occupying the roles of CEO and chairperson of the board. Insiders are employees who have board appointments. Both duality and insiders relate to the issue of managers having greater influence and ability to engage in self-interested pursuits (such as higher salaries and undertaking less risky opportunities) than desired by principals. Agency theorists typically (though not always) view duality and insiders as being negatively associated with shareholder wealth maximization (Boyd 1995; Dalton et al. 1998).

To align management and shareholder interests, firms use an array of compensation arrangements including base salary, stock grants, stock options, and bonuses (Sigler and Sigler 2015). Incentive compensation structures are typically associated with reducing agency issues; however, opposite human capital theory, agency theory would suggest that CEOs receive less guaranteed pay (and more incentive compensation). We suggest that the reduction of agency issues (i.e., increased CEO ownership, founder retention, fewer insiders, no duality) affects compensation and net proceeds. Thus, the hypotheses:

Hypothesis 2a Biopharmaceutical IPOs with fewer agency issues will be associated with lower CEO base salary.

Hypothesis 2b Biopharmaceutical IPOs with fewer agency issues will be associated with greater CEO total incentive compensation.

Agency theory implies an incentive to design CEO compensation arrangements tailored to the company's needs (Nikbakht et al. 2007). Firms considering an IPO must expand their needs to include the needs of external investors. As investors form opinions about each type of compensation, it is reasonable that investors consider CEOs compensation structure when determining the value of the firm (Nikbakht et al. 2007). Asymmetric information is often problematic in new market sectors (e.g. biotechnology) (Sanders and Boivie 2004) and for new investors (Ross 1973) of firms going public for the first time. When information asymmetry is high, new investors typically discount prices or value of the firm. To alleviate information asymmetry, investors seek more qualitative means of evaluating the firm, such as examining governance structures (i.e., CEO duality, insiders on board) in a firm's proxy statements (Sanders and Boivie 2004)—with this applying to both agency issues and human capital considerations. Aligning shareholder and CEO interests sends a strong signal to future owners that their interests and wealth will be maximized (He and Wan 2013). Thus, the hypothesis:

Hypothesis 2c Biopharmaceutical IPOs with fewer agency issues will be associated with greater net proceeds.

2.3 Market response

Factors affecting the pricing of firms going public for the first time are not well understood (Chahine and Filatotchev 2008; Lee et al. 2011). The finance literature on the market's response to an IPO often examines mispricing. Mispricing pertains to the increase (underpricing) or decrease (overpricing) of the stock price on the first day of trading relative to what the underwriters or investment banks initially paid the pre-IPO owners for the stock prior to selling it on an open market (e.g. NASDAQ, New York Stock Exchange). Research has shown underpricing to be a common mispricing issue (Chahine and Goergen 2011). Nimalendran et al. (2007) note that during 1999 and 2000 (Internet bubble years), pre-IPO investors would have gained an additional $63.5 billion had it not been for underpricing. Loughran and Ritter (2002) suggest that pre-IPO investors do not get upset about "leaving money on the table" or underpricing as long as their overall wealth increases.

The success of an IPO includes not only the price paid for the stock but also the net amount raised by the IPO (Loughran and Ritter 2002). It is the net amount raised that is of interest to this study. The amount raised is the product of the price of the stock times the number of shares sold. From the firm's perspective, it is the amount raised or net proceeds that primarily determines the overall success of an IPO (Williams et al. 2010).

The factors that impact the overall amount raised have received little attention in the literature (Daily et al. 2005). Related to our study, it is reasonable to expect that the configuring of the firm and personnel be related to attracting IPO owners and raising capital. For example, pre-IPO owners such as venture capitalists expend considerable effort in their decisions about choosing new firms for investment and configuring compensation arrangements to align with their interests and later equity owners (Connell et al. 2013; Kollmann and Kuckertz 2010). New investors may not wish to invest in firms with unaligned incentives such as high salaries and low incentive compensation structures. Aligned incentives and other factors (i.e., founder-CEOs) may act as positive signals to investors. Thus, the hypotheses:

Hypothesis 3a Biopharmaceutical IPO CEOs with lower base salary will be associated with IPOs that raise more in net proceeds.

Hypothesis 3b Biopharmaceutical firm CEOs with greater incentive compensation will be associated with IPOs that raise more in net proceeds.

3 Research method

3.1 Sample

Our sample includes biopharmaceutical firms with standard industrial classification (SIC) codes 2834 (Pharmaceutical Preparations) and 2836 (Biological Products). These firms engage in the creation of new biopharmaceuticals and do not represent complements to this industry. We examine biopharmaceutical IPOs, as this is an

uncertain and dynamic market sector (Williams 2013), with biopharmaceutical firms entering the IPO market in record numbers (Ernst & Young 2013). We found 187 biopharmaceutical firms that went public for the first time between January 1, 1996 and December 31, 2012, with 184 firms with usable data. Data are obtained from the U.S. Securities and Exchange Commission (SEC) filings. Researchers have demonstrated that data from the IPO's prospectus (form S-1 or 424B4) is the primary means of communication for firms going public (Payne et al. 2013).

3.2 Measures

The dependent variables are: CEO base salary at the time of the IPO, CEO total incentive compensation [bonus, other short-term compensation, and long-term compensation (includes the reported value of stock options)] at the time of the IPO, and net proceeds reported in the SEC filing after the IPO. The independent variables as proxies for human capital are: CEO's age, number of years the CEO has worked in the biopharmaceutical sector in a non-academic position, CEO's previous experience as CEO at another firm (Y = 1; N = 0), two variables for CEO's education—MBA (Y = 1; N = 0) and doctoral degree in a scientific field (Ph.D. or M.D.; Y = 1; N = 0), CEO venture capital experience(Y = 1; N = 0), and CEO's attending an Elite school at any reported level of educational background (Y = 1; N = 0). We use Finkelstein's (1992) list of colleges and universities for inclusion in Elite schools. The independent variables as proxies for agency issues are: CEO holding the position of chairperson on the board of directors (Y = 1; N = 0), percentage of CEO ownership interest in the firm at the time of the IPO (exclusive of stock options), and percentage of insiders (percentage of firm employees that hold board seats). Both the human capital and agency literatures examine CEO-founders; we code founder as CEO (Y = 1; N = 0) and elaborate on this in the Discussion section.

We control for the firm's total assets, age, and the date of the IPO. Firm age is operationalized by taking the year/date of the IPO minus the firm's year/date of incorporation (found in the firm's Prospectus). As some firms go public less than a year after date of incorporation, we add 1 year to all firms. We use a continuous variable for the date of the IPO (i.e., 1996 = 1; 1997 = 2, etc.). Following customary procedures, we log transform several of the continuous variables (e.g. salary, incentives, net proceeds, total assets, firm age, and percent CEO ownership) to assist with non-normality issues. For continuous variables that had a value of zero, we add a constant prior to transformation. Data primarily come from the principal stockholders and managers and directors' sections of the firm's prospectus filed with the SEC (form S-1 or 424B4). Data on the IPO's net proceeds are from the firm's first quarterly (form 8 K) or annual (form 10 K) report after the IPO filed with the SEC. The net proceeds are net of transaction costs, which typically include attorney's fees and fees and discounts to underwriters and others. As the length of time varies per IPO, we rely upon the firm for the amount of capital that was raised. As our sample covers 17 time periods, we also adjust the monetary figures (i.e., net proceeds, salary, incentives, and total assets) for inflation. We use an Internet consumer price index inflation calculator provided by the Bureau of Labor

Statistics. All monetary figures are adjusted on a monthly basis to December 1996 levels.

We performed path analyses to examine the relationships among human capital, agency, and control variables with the dependent variables. We utilize path analysis to test our model with the salary and incentive variables being both independent and dependent variables simultaneously. Other tests (such as OLS) do not calculate parameters simultaneously, which we posit is how investors make investment judgments. Path analysis allows us to examine the direct and indirect effects that human and agency issues have on net proceeds. Figure 2 shows the path diagram noting our variables. We do not draw all of the relationships but note that all control and dependent variables mimic the total assets variable (with Fig. 2 not showing covariances among all control and independent variables).

4 Results

Table 1 presents descriptive statistics and correlations for the variables in our model. The mean base salary for the 184 CEOs in our initial sample was $284,721. The inflation adjusted mean salary was $238,046. The mean for potential CEO total incentive compensation was $1,791,071. The inflation adjusted mean for potential CEO total incentive compensation was $1,550,305. The mean for net proceeds was

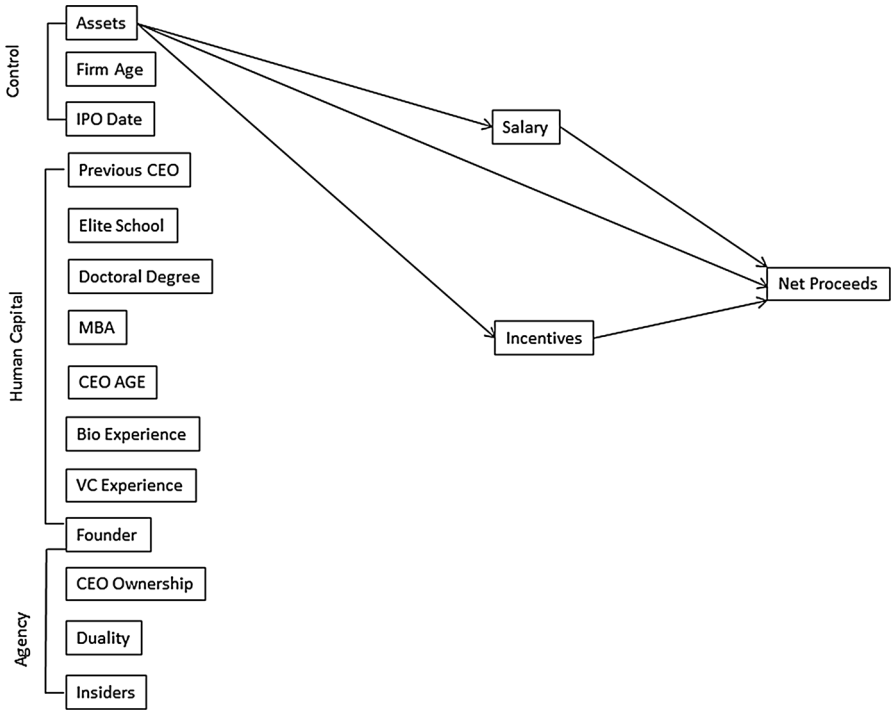

Fig. 2 Variables and relationships. Relationship for all control and independent variables mimic assets

Table 1 Descriptive statistics and correlations

	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Net proceeds (ln)	17.451	.670	–						
CEO incentives (ln)	11.964	3.452	.281**						
(3) CEO salary (ln)	12.297	.508	.324**	.100					
(4) Total assets (ln)	16.734	1.253	.586**	.271**	.512**				
(5) Firm age (ln)	1.895	.517	.175*	.092	.145*	.212**			
(6) IPO date	8.09	4.741	.131	.035	.308**	.268**	.269**		
(7) Previous CEO	.220	.414	−.088	.047	−.088	−.157*	−.135	.149*	
(8) Elite School	.293	.452	−.060	−.025	−.089	−.127	−.068	.078	.239*
(9) Doctoral degree	.530	.500	−.011	−.036	.021	−.038	.059	−.180*	−.219
(10) MBA	.270	.443	−.087	.018	−.163*	−.119	−.037	.061	.189*
(11) CEO Age	49.350	5.830	.046	.029	.054	.000	.229**	.142	.098
(12) Bio experience	15.130	6.720	.108	.112	.116	.124	.201**	.306*	.110
(13) VC Experience	.150	.355	−.042	.086	.005	−.028	−.172*	.057	.079
(14) CEO ownership (ln)	2.7644	.418	.015	−.271*	.025	−.080	.004	.000	.126
(15) Founder	.430	.496	.141	−.217**	−.003	−.004	−.098	−.003	−.058
(16) CEO duality	.300	.459	−.013	−.098	−.068	−.007	−.106	−.209**	.030
(17) Insiders	.194	.111	−.191**	−.193**	−.223**	−.179*	−.178*	−.225**	.073

	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) Net proceeds (ln)										
CEO incentives (ln)										
(3) CEO salary (ln)										
(4) Total assets (ln)										
(5) Firm age (ln)										
(6) IPO date										

Table 1 continued

	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(7) Previous CEO										
(8) Elite School										
(9) Doctoral degree	−.042									
(10) MBA	.314**	−.569**								
(11) CEO Age	−.080	.007	−.135							
(12) Bio experience	−.080	−.225**	−.085	.547**						
(13) VC Experience	.205**	−.042	.063	−.125	−.207**					
(14) CEO ownership (ln)	.043	−.019	.044	−.011	−.131	.027				
(15) Founder	.044	.130	−.200**	−.069	−.149*	.013	.383**			
(16) CEO duality	.022	.112	−.098	−.002	−.211**	.065	.418**	.273**		
(17) Insiders	−.013	−.002	.022	.056	−.066	.094	.288**	.165*	.266**	–

$n = 184$

* Significant at the .05 level, ** significant at the .01 level

$59,973,645. The inflation adjusted mean for net proceeds was $49,303,454. The mean age (from incorporation to IPO) was 6.6 years. The mean total assets at the time of IPO were $53.8 million. The mean total assets adjusted for inflation was $44.1 million. We also test for multicollinearity and find VIF values of less than 2.0 for all variables, which is well below the cut-off threshold of 10 (Hair et al. 1998).

Results indicate that our model provides a "good fit" for the data (RMSEA = .000; CFI = .100). Acceptable model fit is indicated by a root mean square error of approximation (RMSEA) value of .06 or less, and a comparative fit index (CFI) or normed fit index (NFI) of .90 or greater (Hu and Bentler 1999). We note, but do not show, that our model has other comparative fit indices (e.g. AIC and BIC) that are indicative of a good fitting model.

Table 2 depicts the unstandardized regression weights. The control variable of total assets plays a significant role in explaining all three dependent variables. The age of the firm is not found to be statistically significant. Firms that went public at a later date were related to higher CEO salaries, but not CEO incentives or greater net proceeds.

The variables of venture capital experience, insiders, founder, and ownership interest were the independent variables found to be significant statistically. There was a positive statistically significant relationship between venture capital experience and incentive compensation. This to a limited extent supports H1b. There is a positive statistically significant relationship between the CEO being a founder and the net proceeds received by the firm during the IPO. This to a limited extent supports H1c and H2c. The market apparently prefers firms whose founders remain as CEOs.

There was a negative statistically significant relationship between insiders and salary. This partially supports H2a. CEOs owning a greater percentage of the firm were paid higher salaries. There is a negative statistically significant relationship between CEO ownership interest and CEO incentive compensation—the direction of the finding suggests that CEOs who own a significant percentage of the firm are not seeking to increase their interest via other incentive mechanisms. The results related to CEO ownership taken together to a limited extent supports H2b.

The results show incentives to be positive statistically significant in relation to net proceeds. This supports H3b. Table 3 summarizes the results in relation to our hypotheses.

Figure 3 depicts the relationships with significant results using the standardized regression weights and covariances. We show all significant results of regression weights and only covariances related to our dependent variables that were statistically significant. There are no significant covariances between our control variables and independent variables (e.g. total assets and founders, suggesting that founders similarly remain with large and small firms). There are other statistically significant covariances between other dependent variables, which we do not show (instead we focus on the regression weights and our hypotheses). Our model explained 48.1% of CEO salary, 20.9% of CEO incentive compensation, and 37.3% of the net proceeds received by the firm through the initial public offering process.

Table 2 Unstandardized regression weights and squared multiple correlations

Related hypothesis	Description of path	Estimate	SE	C.R.	*P*
Control	(LN) CEO salary ← (LN) total assets	.180	.029	6.702	***
Control	(LN) CEO incentives ← (LN) total assets	.743	.201	3.695	***
	(LN) CEO salary ← (LN) firm age	−.042	.067	−.629	.529
	(LN) CEO incentives ← founder	−.655	.532	−1.231	.218
	(LN) CEO salary ← (LN) CEO ownership	.189	.089	2.116	.034
	(LN) CEO incentives ← (LN) CEO ownership	−1.686	.667	−12.528	.011
	(LN) CEO salary ← elite school	−.009	.076	.112	.911
	(LN) CEO incentives ← elite School	−.288	.569	−.507	.612
	(LN) CEO salary ← doctoral degree	.003	.083	.038	.970
	(LN) CEO incentives ← doctoral degree	.319	.621	.514	.607
	(LN) CEO salary ← CEO age	.004	.007	.585	.559
	(LN) CEO incentives ← CEO age	−.008	.049	−.162	.871
	(LN) CEO salary ← VC experience	.040	.093	.434	.664
	(LN) CEO incentives ← VC experience	1.358	.692	1.962	.050
	(LN) CEO salary ← MBA	−.148	.097	−1.520	.128
	(LN) CEO incentives ← MBA	.526	.725	.725	.468
	(LN) CEO salary ← bio experience	−.001	.006	−.210	.834
	(LN) CEO incentives ← bio experience	.050	.047	1.057	.291
	(LN) CEO salary ← insiders	−.607	.309	−1.967	.049
	(LN) CEO incentives ← insiders	−3.530	2.305	−1.532	.126
Control	(LN) CEO salary ← IPO date	.018	.008	2.341	.019
Control	(LN) CEO incentives ← IPO Date	−.088	.058	−1.524	.128
Control	(LN) CEO salary ←(LN) firm age	−.042	.067	−.629	.529
Control	(LN) CEO incentives ← (LN) firm age	.431	.500	.862	.389
	(LN) CEO salary ← CEO duality	−.074	.079	−.946	.344
	(LN) CEO incentives ← CEO duality	−.287	.354	−.809	.418
	(LN) net proceeds ← (LN) CEO Salary	.035	.091	.388	.698
	(LN) net proceeds ← (LN) CEO incentives	.033	.012	2.668	.008
Control	(LN) net proceeds ← (LN) total assets	.282	.038	7.412	***
	(LN) net proceeds ← founder	.267	.088	3.025	.002
	(LN) Net Proceeds ← (LN) CEO ownership	.136	.113	1.201	.232
	(LN) net proceeds ← elite school	.018	.094	.192	.847
	(LN) Net Proceeds ← doctoral degree	−.001	.103	−.006	.995
	(LN) net proceeds ← CEO age	.005	.008	.650	.516
	(LN) net proceeds ← VC experience	−.020	.115	−.171	.864
	(LN) net proceeds ← MBA	.035	.120	.292	.770
	(LN) net proceeds ← bio experience	.004	.008	.475	.635
	(LN) net proceeds ← insiders	−.686	.386	−1.775	.076
Control	(LN) net proceeds ← IPO date	−.013	.010	−1.366	.172
Control	(LN) net proceeds ← (LN) firm age	.057	.083	.695	.487

Table 2 continued

Related hypothesis	Description of path	Estimate	SE	C.R.	*P*
	(LN) net proceeds ← CEO duality	−.080	.097	−.818	.413
Squared	(LN) CEO Salary	.337			
multiple	(LN) CEO incentives	.198			
correlations	(LN) net proceeds	.417			

*** Signifies < .001

Table 3 Summary table of hypotheses and results

Hypothesis	Supported/partially supported	Not supported
H_{1a}: ↑human capital → ↑ salary		X
H_{1b}: ↑human capital → ↑ incentives	X	
H_{1c}: ↑human capital → ↑ net proceeds	X	
H_{2a}: ↓agency issues → ↓ salary	X	
H_{2b}: ↓agency issues → ↑ incentives	X	
H_{2c}: ↓agency issues → ↑ net proceeds	X	
H_{3a}: ↓salary → ↑ net proceeds		X
H_{3b}: ↑incentives → ↑ net proceeds	X	

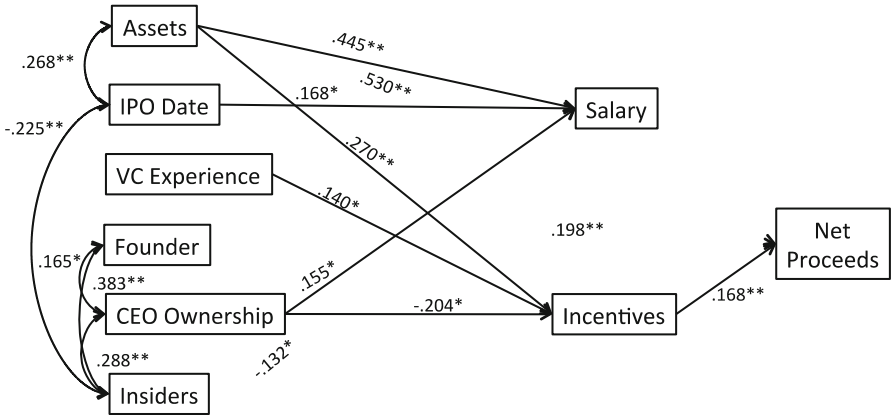

Fig. 3 Statistically significant standardized regression weights and select covariances. *Significant at .05; **significant at .01

5 Discussion

To better understand the determinants of CEO base pay and incentive compensation of firms that have recently gone public, and examine human capital and agency factors that affect the market's response to the initial public offering, we developed and examined a model to test these factors simultaneously. Our findings add to the existing research in understanding how compensation affects the ability to raise capital (Certo et al. 2003), particularly in newer firms where CEOs have the ability to affect performance (Conyon and He 2004). Also, we contribute to the limited research on executive compensation in entrepreneurial firms that is less studied than established firms (Conroy et al. 2015). Furthermore, we examine these issues in the biopharmaceutical industry which has an uncertain environment for marketable products and is difficult to value using traditional financial measures (Ahn et al. 2015).

We note that founders often are considered by both human capital and agency theories. In a sense, founder-CEOs provide a nexus for the human capital and agency literatures related to IPOs. In this study we place founders within both the human capital and agency areas. We posit, however, that related to base salary human capital and agency theory may predict different outcomes. The literature suggests that related to human capital, founders have intrinsic attributes, which may be irreplaceable (He 2008), and thus may be rewarded for this in terms of greater base pay. Our findings did not support this. The profound commitment by some founders also may have an "anti-agency" effect (Certo et al. 2009; Fama and Jensen 1983; Nelson 2003)—meaning founder-CEOs may reduce agency issues. For example, a founder may make sacrifices including accepting lower base compensation to further firm survival (Wasserman 2003), as their identities may be tightly aligned with the firm (Wasserman 2006). When we exclude founder-CEOs from the human capital variables, no human capital variable has a significant effect on net proceeds. The IPO market appears to reward [in terms of higher net proceeds (inflation adjusted)] the firms with founder-CEOs and CEOs with higher incentives.

Taken together, our findings perhaps suggest that the IPO market is more interested in commitment of the CEO than who or what (human capital) the CEO is. In this regard, a founder may represent more of a psychological (Arthurs and Busenitz 2003) and financial commitment to the firm as opposed to someone who brings unique skills, knowledge, and experiences. The agency literature of aligning incentives between managers and owners implies this. Our finding of the positive significant relationship between CEO incentive compensation and net proceeds (and the covariances between founder and ownership interest) re-enforces this principal-agent issue. Those CEOs with venture capital experience may realize the relationship between incentives and net proceeds, as there is a significant relationship between those with venture capital experience and incentives. This is to say that those with venture capital experience may understand the greater benefit in terms of net proceeds (and thus perhaps individual wealth via stock options) associated with greater CEO incentives.

Our findings are similar to studies (e.g. Certo et al. 2003; Nikbakht et al. 2007; Sanders and Boivie 2004) that found stock options and ownership interests of the CEO and other top managers increase IPO valuation. Our findings are similar to Allcock and Filatotchev's (2010) findings on the negative relationship between IPO founders and compensation incentive schemes—what can be described as the "soft" side of compensation. Adding to what is known in the literature, we find that what may be described as the "hard" side of compensation [e.g. salary (and a gap in the literature)] is negatively associated with insiders, but positively associated with CEO ownership. Examining this aspect with covariances (i.e., between founder and ownership), founder-CEOs may be substituting higher ("hard") salaries for lower ("soft") incentive compensation as they already have both financial and psychological commitment to the firm.

Furthermore, a noteworthy consideration is that pre-IPO owners (such as other biopharmaceutical firms) oftentimes replace founders as CEOs prior to the IPO (Zarutskie 2010). Venture capitalists in particular have a tendency to replace top management in firms in which they invest (Pollock et al. 2009). Venture capitalists and others also establish elaborate contractual controls to reduce agency issues (Arthurs et al. 2007). Knowing this, a surviving founder may signal to potential IPO investors that the CEO-founder has a positive effect on the firm, and that the CEO-founder is perceived to have unique value by venture capitalists.

A founding CEO is more likely to have a greater current ownership stake in the firm (as our covariances show) compared with a replacement CEO who may have a mixture of stock grants and options (Pukthuanthong et al. 2007). In a stock option arrangement the individual is "out" only an opportunity; whereas in an ownership arrangement the owners may have invested their own capital, which may further their commitment to the firm. Although not examined in the present study, given this propensity for founder-CEOs to be replaced, firms with founders as CEOs may signal legitimacy and thus higher net proceeds. Our study complements He (2008). He (2008) found that founder-CEOs might represent resources as opposed to liabilities when compared with professional CEOs and the firm's financial performance (e.g. ROA) and survival. We do not know for certain, but raising a greater amount of capital at the IPO may increase the likelihood of survival.

Our findings also may support an under-examined aspect of agency theory applied to IPOs. The agency literature typically suggests that CEOs should be paid incentives that align interests with shareholders. Downplayed in much of the agency-IPO literature is that many CEOs (whether founders or not) are already owners of the firm and the IPO itself represents a dilution of ownership and control of the firm for the pre-IPO owners. Our findings suggest that the IPO market rewards future ownership. That is, the IPO market may be saying that it wants the CEO to remain committed to the firm and share in the risk/rewards. The IPO market knows the founder-CEO is diluting interest via an IPO, but may not want this person to exit. As the IPO also represents a significant transformation for the firm, this may have implications for other types of transitions—we do not know and more research is needed.

We found no significant relationship between base salary and net proceeds. This may suggest that the IPO market does not care what is paid to the CEO in base

salary. Nor did we find mediating effects of salary on net proceeds. Thus, what appears to matter is founder commitment and aligned incentives. For a firm spending in excess of one billion dollars to develop a drug (DiMasi and Grabowski 2007), hundreds of thousands of dollars in base pay for the CEO may seem insignificant to new shareholders—a reverse form of Loughran and Ritter's (2002) "leaving money on the table." Just as pre-IPO owners may not care about underpricing stock as long as their overall wealth goes up, so too may post-IPO owners care little about the CEO's base pay as long as incentives are aligned with the expectation that their shares will increase over time. This finding may be important to the founder who has already invested both sweat and real equity in the firm. This is to say that in terms of salary, founders themselves may be leaving money on the table when negotiating with other pre-IPO owners (e.g. venture capitalists, other biopharmaceutical firms) as the amount of salary does not seem to matter to the market. This is an interesting finding as a recent trend reported in the trade press (see Wieczner 2017) is for IPO founder-CEOs to reduce their salaries around the time of the IPO seeking to send the market signals of value, commitment, and confidence. This aspect related to salary would be in keeping with agency theory. Our non-significant findings neither support nor contradict this effort, suggesting that to a limited extent the salary of the CEO does not matter to the market given the variables in our model. Thus, CEOs (and perhaps founder-CEOs in particular) may be leaving money on the table in terms of salary, all things considered. We believe this to be a significant finding given the long and continuous tradition of seeking to align management and shareholder interests.

Our paper has several limitations. In studying biopharmaceutical IPOs from 1996 through 2012, we do not know if the findings would be the same for firms in other industries or during different time periods. Also, we study small firms going public, and do not know if our findings would apply to established firms. We did not examine other measures of the market's response and performance such as stock price or Tobin's Q. We do not know how our findings would relate to follow-on offerings after the IPO. Although we controlled for the date, we did not control specifically for "hot markets" and "cold markets" or account for other issues such as the financial downturn of 2008. We recognize that other studies use other variables to address human capital and agency issues. We examine variables that are widely used and were available in the prospectuses. More research is needed to see if similar results would be achieved using different proxies for human capital and agency issues. We also note that other factors or theoretical lens may help explain compensation structures and the market's response. Stewardship (Wasserman 2006) and signaling (Zimmerman 2008; Zhang and Wiersema 2009) theories (among others) may help explain some of the relationships specifically as they relate to the commitment and legitimacy of founder-CEOs.

Our study examines the effects that human capital and agency issues have on CEO compensation and the amount raised in an IPO. We find that outside of founders and founders with venture capital experience, CEO human capital has no significant effect on our model. The IPO market, in terms of being able to raise greater amounts of capital, rewards firms with founder-CEOs and CEOs who have greater incentive arrangements. The results should add to our understanding related

to governance, compensation and human capital and agency theories. It should also help firms and investors better understand (and, perhaps, structure) CEO compensation.

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David R. Williams is Professor and Undergraduate Program Director for the Health Care Management Program at Appalachian State University. His research interests relate to the financing, governance and management of entrepreneurial health- related firms.

Betty S. Coffey is a Professor of strategic management in the Walker College of Business at Appalachian State University. Her research interests include corporate governance, strategy implementation, and entrepreneurship.

Carlton C. Young is an Associate Professor in the College of Business at Mississippi State University, where he specializes in health care management and strategy. He is an editor of the Journal of Legal, Ethical and Regulatory Issues and an Editorial Board member of the Journal of Healthcare Risk Management.